Course Syllabus
STAT 449/649: Quantitative Financial Risk Management
Dr. Katherine B. Ensor
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Fall 2019

Lecture: TTh 11:20 – 12:40 FULLY ONLINE
Office Hours: 1:00 to 2:00 Monday

TA and co-Instructor: Michael Jackson
Michael.jackson@rice.edu
Office hour: TBD
TA: Fan Gao
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OFFICE HOUR: TBD (fill out doodle poll https://doodle.com/poll/cyxxums4grgzv87h)
and by appointmnet

Course Objective: To educate students on the foundation and practical implementation of stochastic calculus and methods underlying financial instruments such as derivatives, forward contracts, options and bonds.

Text:

- Stochastic Calculus for Finance I: The Binomial Asset Pricing Model by Steven E. Shreve. This text will be followed for the first half of the course.
- NOTE – We are in the process of producing a version of this text based on our Rice curriculum. We will be sharing this material with you on a chapter by chapter basis, when available. Complete lecture notes will be provided for each class.
- Text 2 – Supplemental material will be provided for the continuous time discussions.

Computing Required: This course will require computing and data analysis, relying on the statistical software package R (https://www.r-project.org/). We all use R through RStudio (rstudio.com).

Assessment:

- 30% Exam I – in class – October 1st
- 40% Exam II – This exam will be given in two parts on Dec 1st and Dec 3rd, and hence is given extra weight.
- 30% Quizzes, class participation, Canvas discussion participation, and homework.
- Exams will be open book, notes and internet but will be time limited. You may NOT converse with other people about the exam until all exams are completed.

- There will be additional exam questions, quizzes and homework questions for STAT 649 students based on the assumption of graduate level background knowledge in statistics.
- HW will be assigned and graded for completion (not accuracy). Knowledge assessment will come in the form of quizzes related to the homework. If homework is graded for accuracy, this change will be made clear when the assignment is made.

Attendance: Students will benefit from regular attendance. All lectures will be recorded. Quizzes given in class can be completed up to 12 hours after the class period in which they are given.

Canvas: All course management will take place through CANVAS. If you have a question about the homework post your question on the Canvas website under the 'Discussions' tab. Discussion between students both on the forum and virtually is HIGHLY encouraged. If you see a question posted on the discussion forum and you know the answer, please respond. Your level of participation in the HW discussion represents a portion of your quiz and homework grade.

Students with disabilities: Please work with Rice Disability Support Services and apprise me of any accommodations that are needed.

Rough List of Topics – SUBJECT TO CHANGE (# of lectures)

- (1) Introduction to Derivatives, Forward contracts, Options, Bonds
- (12) Binomial Discrete Time Models
    - (2) Binomial No-Arbitrage Pricing Model
    - (2) Probability theory for discrete events
    - (2) State Prices
    - (2) American Derivative Securities
    - (2) Random Walk
    - (2) Interest-Rate-Dependent Assets
- Exam I – October 1st
- (10) Continuous Time Models
    - (3) Introduction to Stochastic Processes and Modeling Stocks in Continuous Time
    - (3) Black-Scholes + Greeks
    - (3) Volatility, variance contracts and exotic options
    - (1) Liquidity and micro-structure
- (3) Fixed Income Models
- Exam II – Dec 1st and Dec 3rd